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10/708,428	03/02/2004	Ang-Sheng Lin	12539-US-PA	2427

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TAIPEI, 100
TAIWAN

EXAMINER

HUANG, DAVID S

ART UNIT	PAPER NUMBER
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2611

NOTIFICATION DATE	DELIVERY MODE
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05/06/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/708,428	Applicant(s) LIN, ANG-SHENG	
	Examiner DAVID HUANG	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 4, 6 and 7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5 and 8-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 February 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Allowable Subject Matter

1. The previous indication of allowable subject matter for claims 7 and 8 (now incorporated into claims 1, 2, 9 and 10) has been withdrawn. Upon further consideration, a new ground(s) of rejection is made in view of Kramer (US 2003/0087614).

Response to Arguments

2. Applicant's arguments, with respect to the drawings and specification have been fully considered and are persuasive. The objection of November 6, 2007 has been withdrawn.

3. Applicant's arguments, with respect to claims 1, 3, 7 and 8 have been fully considered and are persuasive. The objection of November 6, 2007 has been withdrawn.

Claim Objections

4. Claim 9 objected to because of the following informalities: In Claim 9, lines 6-7, "the predetermined time interval" lacks antecedent basis in the claim. The "the" should be changed to "a". Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-3, 5, and 8-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (Background of the Invention, pages 1-3, and Figure 1B; hereafter AAPA) in view of Kramer (US 2003/0087614) and Burgin (US 6,298,096).

Art Unit: 2611

Regarding **claims 1 and 10**, AAPA discloses a quadrature modulator, comprising:

a base band transconductance, for converting a voltage signal into a current signal (130a and 130b, Figure 1B);

a switching pair for modulating the current signal (132a and 132b, Figure 1B).

However, the admitted prior art fails to expressly disclose (1) a current sink, coupled between the output and the input of the base band transconductance, for detecting a current offset of the current signal, (2) wherein when the current sink is enabled to detect the current offset of a transmitter within a predetermined time interval, the switching pair is disabled, and after the predetermined time interval lapses, the current sink is disabled and the switching pair is enabled, and (3) an offset compensation module, including a current-to-voltage converter coupled to the current sink module, a direct current (DC) offset minimum loop being coupled to the current-to-voltage converter for compensating a voltage offset within the predetermined time interval.

With respect to items (1) and (3), Kramer discloses a transmitter system with a modulation calibration system in which offset effects of the mixer are compensated or accounted for in modulating the baseband signals for transmission (page 1, [0008], Fig. 3 and 4). In calibration mode, switches S1 and S2 are closed and the local oscillator system 228 is deactivated, current signal I1 and I2 are output from transconductance amplifier 250, and flow through resistor R1 and transistor Q1, and resistor R2 and transistor Q4. Feedback amp 240 and comparator 244 operate to provide an indication of a polarity associated with the output signal from the mixer 224 by virtue of a comparison of the amplified signal from the feedback amplifier 240 to a ground reference (page 5, [0035]-[0037], Fig. 3 and 4; it is implicit that out current signal I1 and I2 are converted into a voltage signal by feedback amplifier 240, since the output of

Art Unit: 2611

the amplifier is compared in comparator 244 to ground reference, a voltage). Digital system 212 provides a digital value to the DAC 216 so as to provide a constant DC input voltage level to the low pass filter 220. The digital system 212 changes the digital value provided to the DCA 216 in response to the output of the feedback amplifier 240 and comparator 244 (page 5, [0034], Fig. 3). This is advantageous since these calibration techniques and systems can account for adverse effects of any component mismatches in the mixer 224, including transistors in the transconductance amp 250 (page 4, [0031]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA with the transmitter and modulation calibration system taught by Kramer since it improves performance by compensating for offset and leakages of mixers in addition to modulator system DACs, LPFs (page 3, [0026], Fig. 3 and 4).

With respect to item (2) Burgin discloses a predistortion quadrature modulator which operates in 2 modes. The first mode, is a transmission mode in which the signals to be transmitted are modulated according to the normal operation and transmitted over a wireless link. The second mode is a calibration mode in which no signal is being transmitted. In a TDMA system, calibration mode is made active between the transmission slots (column 4, line 61 – column 5, line 3; a predetermined time interval is implicit). In calibration mode, a determines a set of predistortion parameters for use in subsequence transmission mode operation (column 5, lines 16-20) to pre-compensate for errors introduced by circuit imperfections in the quadrature modulator (column 5, lines 25-30). This teaching is advantageous, since it improves performance by adaptively compensating for circuit imperfections before data is transmitted.

It would have also be obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA and Kramer with the two modes of operation taught by Burgin since it improves performance by adaptively compensating for imperfections in the circuit before transmitted data can be effected in the transmission mode.

Regarding **claim 2**, AAPA discloses a transmitter, comprising:

a digital-to-analog converter module for receiving voltage signals (DAC 110a and 110b, Figure 1B);

a base band filter module, coupled to the analog converters module (112a and 112b, Figure 1B);

a quadrature module coupled to the base band filter module, for converting filtered voltage signals into current signals and then modulating the current signals (100, Figure 1B); and

a radio frequency amplifier, coupled to the quadrature module, for amplifying the modulated current signals and then transmitting amplified signals to an antenna (118, Figure 1B).

However, AAPA fails to expressly disclose (1) a current sink module, coupled to the quadrature module and enabled for intercepting the current signals to detect a current offset before the current signals are modulated;

(2) an offset compensation module, coupled between the current sink module and one of the digital-to-analog converter module, the base band filter module and the quadrature module, for compensating the current offset when the current sink module is enabled, wherein the offset compensation module comprises a current-to-voltage converter coupled to the current sink module, and a direct current (DC) offset minimum loop coupled to the current-to-voltage converter for compensating a voltage offset within a predetermined time interval;

(3) wherein the quadrature module further comprises a base band transconductance and a switching pair, and the current sink module is arranged there between;

(4) when the current sink module is enabled within the predetermined time interval, and the switching pair is enabled after the predetermined time interval lapses.

With respect to items (1) to (3), Kramer discloses a transmitter system with a modulation calibration system in which offset effects of the mixer are compensated or accounted for in modulating the baseband signals for transmission (page 1, [0008], Fig. 3 and 4). In calibration mode, switches S1 and S2 are closed and the local oscillator system 228 is deactivated, current signal I1 and I2 are output from transconductance amplifier 250, and flow through resistor R1 and transistor Q1, and resistor R2 and transistor Q4. Feedback amp 240 and comparator 244 operate to provide an indication of a polarity associated with the output signal from the mixer 224 by virtue of a comparison of the amplified signal from the feedback amplifier 240 to a ground reference (page 5, [0035]-[0037], Fig. 3 and 4; it is implicit that out current signal I1 and I2 are converted into a voltage signal by feedback amplifier 240, since the output of the amplifier is compared in comparator 244 to ground reference, a voltage). Digital system 212 provides a digital value to the DAC 216 so as to provide a constant DC input voltage level to the low pass filter 220. The digital system 212 changes the digital value provided to the DCA 216 in response to the output of the feedback amplifier 240 and comparator 244 (page 5, [0034], Fig. 3). This is advantageous since these calibration techniques and systems can account for adverse effects of any component mismatches in the mixer 224, including transistors in the transconductance amp 250 (page 4, [0031]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA with the transmitter and modulation calibration system taught by Kramer since it improves performance by compensating for offset and leakages of mixers in addition to modulator system DACs, LPFs (page 3, [0026], Fig. 3 and 4).

With respect item (4) Burgin discloses a predistortion quadrature modulator which operates in 2 modes. The first mode, is a transmission mode in which the signals to be transmitted are modulated according to the normal operation and transmitted over a wireless link. The second mode is a calibration mode in which no signal is being transmitted. In a TDMA system, calibration mode is made active between the transmission slots (column 4, line 61 – column 5, line 3; a predetermined time interval is implicit). In calibration mode, a determines a set of predistortion parameters for use in subsequence transmission mode operation (column 5, lines 16-20) to pre-compensate for errors introduced by circuit imperfections in the quadrature modulator (column 5, lines 25-30). This teaching is advantageous, since it improves performance by adaptively compensating for circuit imperfections before data is transmitted.

It would have also be obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA and Kramer with the two modes of operation taught by Burgin since it improves performance by adaptively compensating for imperfections in the circuit before transmitted data can be effected in the transmission mode.

Regarding **claim 3**, AAPA discloses everything claimed as applied to claim 2 above, but fails to expressly disclose when the current sink module is enabled, the switching pair is disabled.

Burgin discloses a predistortion quadrature modulator which operates in 2 modes. One of the modes is a calibration mode in which no signal is being transmitted. In a TDMA system, calibration mode is made active between the transmission slots (column 4, line 61 – column 5, line 3; a predetermined time interval is implicit). In calibration mode, a determines a set of predistortion parameters for use in subsequence transmission mode operation (column 5, lines

Art Unit: 2611

16-20) to pre-compensate for errors introduced by circuit imperfections in the quadrature modulator (column 5, lines 25-30). This teaching is advantageous, since it improves performance by adaptively compensating for circuit imperfections before data is transmitted.

It would have also be obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA and Walker with the two modes of operation taught by Burgin since it improves performance by adaptively compensating for imperfections in the circuit before transmitted data can be effected in the transmission mode.

Regarding **claim 5**, AAPA disclose everything claimed as applied to claim 2 above, but fail to expressly disclose the offset compensation module is coupled between the current sink module and one of the digital-to-analog converter module, the base band filter module and the base band transconductance.

Kramer discloses digital system 212 is connected between comparator 244 (with FB AMP 240) and both I channel DAC 216 (Fig. 3, DAC connected in series before mixer 224 with transconductance amp 250, Fig. 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA with the transmitter and modulation calibration system taught by Kramer since it improves performance by compensating for offset and leakages of mixers in addition to modulator system DACs, LPFs (page 3, [0026], Fig. 3 and 4).

Regarding **claim 8**, AAPA discloses everything claimed as applied to claim 2, but fails to expressly disclose wherein the DC offset minimum loop is further coupled to the digital-to-analog converter module, the base band filter module, and the base band transconductance.

Kramer disclose Kramer discloses digital system 212 is connected to DAC 216 (Fig. 3, DAC 216 connected in series with LPF 220 and mixer 224 with transconductance amp 250, Fig. 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA with the transmitter and modulation calibration system configuration taught by Kramer since it improves performance by compensating for offset and leakages of mixers in addition to modulator system DACs, LPFs (page 3, [0026], Fig. 3 and 4).

Regarding **claim 9**, AAPA fails to expressly discloses a method for detecting and compensating a current offset for a transmitter, the transmitter having a quadrature modulator including a base band transconductance stage, a switching pair, a current sink, and an offset compensation module arranged there between, wherein, the offset compensation module includes a current-to-voltage converter coupled to the current sink, and a direct current (DC) offset minimum loop is coupled to the current-to-voltage converter for compensating a voltage offset within the predetermined time interval, and the method comprises:

- (1) enabling the transmitter;
- (2) turning on the current sink and turning off the switching pair for a predetermined time interval;
- (3) compensating the current offset within the predetermined time interval; and
- (4) turning off the current sink and turning on the switching pair after the predetermined time interval lapses.

With respect to item (1), enabling the transmitter is inherent to operation of a transmitter, otherwise, it would not function. AAPA discloses a transmitter with a quadrature modulator

Art Unit: 2611

including a base band transconductance (130a and 130b, Figure 1B) and a switching pair (132a and 132b).

Furthermore, Kramer discloses a system and modulator calibration techniques which account for the offsets and leakages of modulator system DACs, LPFS, and mixers, and which further account offsets and other problems in feedback circuitry, by which significant performance improvement can be achieved compared with conventional techniques (page 3, [0026], Fig. 3-4; see rejection of claims 1 and 10 above).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA with the transmitter and modulation calibration system taught by Kramer since it improves performance by compensating for offset and leakages of mixers in addition to modulator system DACs, LPFs (page 3, [0026], Fig. 3 and 4).

With respect to items (2) to (4), Burgin discloses a predistortion quadrature modulator which operates in 2 modes. The first mode, is a transmission mode in which the signals to be transmitted are modulated according to the normal operation and transmitted over a wireless link. The second mode is a calibration mode in which no signal is being transmitted. In a TDMA system, calibration mode is made active between the transmission slots (column 4, line 61 – column 5, line 3; a predetermined time interval is implicit). In calibration mode, a determines a set of predistortion parameters for use in subsequence transmission mode operation (column 5, lines 16-20) to pre-compensate for errors introduced by circuit imperfections in the quadrature modulator (column 5, lines 25-30). This teaching is advantageous, since it improves performance by adaptively compensating for circuit imperfections before data is transmitted.

It would have also be obvious to one of ordinary skill in the art at the time the invention was made to provide AAPA and Kramer with the two modes of operation taught by Burgin since it improves performance by adaptively compensating for imperfections in the circuit before transmitted data can be effected in the transmission mode.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID HUANG whose telephone number is (571)270-1798. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSH/dsh
April 29, 2008
/David Huang/
Examiner, Art Unit 2611

/Shuwang Liu/
Supervisory Patent Examiner, Art Unit
2611

Application/Control Number: 10/708,428
Art Unit: 2611

Page 13